

What is claimed is:

1. In a base station of a CDMA mobile communication system capable of compensating a route delay factor on a communication route between a base station and a mobile station such as on a relay unit,  
5 a base station for compensating a route delay factor fixed between a base station and a mobile station of a CDMA mobile communication system, comprising:

10 a clock signal generation unit for receiving a 10MHz, TOD and 1 PPS signal from a GPS receiving unit and generating a 1st even second clock signal in synchronization with the 1 PPS and a 2nd even second clock signal which is obtained by delaying the 1st even second clock signal by a maximum bidirectional propagation delay time between a base station and a relay unit;

15 a first signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit and modulating a forward link channel from the base station to a mobile station in synchronization with the 1st even second clock signal; and

20 a second signal processing unit for receiving the 2nd even second clock signal from the clock signal generation unit and demodulating a backward link channel from the mobile station to the base station in synchronization with the 2nd even second clock signal.

2. The base station of claim 1, wherein said first signal processing unit includes:

25 more than one channel element including a set of base station

modem ASICs for modulating a digital signal;

more than one channel card formed of a channel card for controlling the channel element for thereby modulating a forward link channel; and

5 an analog demodulation unit including a D/A converter for receiving a digital signal from the channel card and a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same.

10 3. The base station of claim 1, wherein said second signal processing unit includes:

more than one channel card including more than one channel element having a set of base station modem ASICs for demodulating a digital signal and a channel card processor for controlling the  
15 channel element; and

an analog demodulation unit having a QPSK demodulator for receiving a RF signal and QPSK-demodulating the same and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting the into a digital signal.

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4. The base station of claim 1, wherein said first and second signal processing units each include a channel card and an analog modulation and demodulation unit, and said channel card is formed of a plurality of channel elements and a channel card processor for  
25 controlling the channel element, and said channel elements are

divided into two parts in which a forward channel and backward channel are modulated and demodulated, respectively, and said analog modulation and demodulation includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK-demodulator for receiving a RF signal and QPSK-demodulating the same and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulator and converting into a digital signal.

5. The base station of claim 1, further comprising a RF signal processing means connected between the first and second signal processing units and the relay unit and having a RF transmission unit for receiving a forward link channel from the first signal processing unit and modulating to a high frequency and a RF receiving unit for receiving a backward channel signal from the relay unit and modulating to a low frequency.

6. A base station operation method for compensating a fixed route delay factor between a base station and a mobile station of a CDMA mobile communication system, comprising the steps of:

a first step in which a clock generation unit receives a 10MHz, TOD, and 1 PPS from a GPS receiving unit and generates a 1st even second clock signal in synchronization with the 1 PPS and a 2nd even second clock signal obtained by delaying the 1st even second clock signal by

a maximum bidirectional propagation delay time between the base station and a relay unit;

a second step in which first and second signal processing units receive 1st and 2nd even second clock signals and modulate a pilot channel, a synchronous channel and a call channel from the first signal processing unit in synchronization with the 1st even second clock signal;

a third step in which when an access channel is transmitted from the mobile station, the second signal processing detects and demodulates the access channel from the mobile station in synchronization with the 2nd even second clock signal;

a fourth step in which the first signal processing unit modulates a communication channel in synchronization with the 1st even second clock signal; and

a fifth step in which when a communication channel is transmitted from the mobile station, the second signal processing unit detects and demodulates the communication channel from the mobile station in synchronization with the 2nd even second clock signal.

7. In a base station of a CDMA mobile communication system capable of compensating a route delay factor on a communication route between a base station and a mobile station such as on a relay unit, a base station for compensating a route delay factor fixed between a base station and a mobile station of a CDMA mobile communication system, comprising:

5 a clock signal generation unit for receiving a 10MHz, TOD and 1 PPS signal from a GPS receiving unit and generating a 1st even second clock signal in synchronization with the 1 PPS and a 2nd even second clock signal which is obtained by delaying the 1st even second clock signal by a maximum bidirectional propagation delay time between a base station and a relay unit;

10 a first signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit and modulating a pilot channel, a synchronous channel and a call channel of a forward link from the base station to a mobile station in synchronization with the 1st even second clock signal; and

15 a second signal processing unit for detecting a communication channel from the clock signal generation unit in synchronization with the 2nd even second clock signal and modulating the communication channel of the forward link from the base station to the mobile station by expediting by the maximum bidirectional propagation delay time between the base station and the relay unit.

20 8. The method of claim 7, wherein said first signal processing unit includes:

25 more than one channel card which includes more than one channel element having a set of base station modem ASICs for modulating a digital signal and a channel card processor for controlling the channel element for thereby modulating a pilot channel a synchronous channel and a call channel of the forward link; and

an analog modulation unit which includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, and a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same.

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9. The method of claim 7, wherein said second signal processing unit includes:

10 more than one channel card which includes more than one channel element having a set of base station modem ASICs for demodulating a digital signal and a channel card for controlling the channel element for thereby modulating a communication channel of a forward link by expediting by a maximum bidirectional propagation delay time; and

15 an analog modulation and demodulation unit which includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulator for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK demodulation unit for receiving a RF signal and QPSK-demodulating the same, and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting  
20 into a digital signal.

10. The method of claim 7, wherein said first and second signal processing units include a channel card and an analog modulation and demodulation unit, and said channel card includes a plurality of  
25 channel elements and a channel card processor for controlling the

channel element, and said channel elements are divided into three portions in which the channel elements modulate a pilot channel, a synchronous channel and a call channel of a forward link, modulates a communication channel of a forward link and modulates a backward link channel, and said analog modulation and demodulation unit includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK demodulation unit for receiving a RF signal and QPSK-demodulating the same, and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting into a digital signal.

11. The base station of claim 7, further comprising a RF signal processing means connected between the first and second signal processing unit and a relay unit and having a RF transmission unit for receiving a forward link channel from the first and second signal processing units and modulating to a high frequency, and a RF receiving unit for receiving a backward channel signal from the relay unit for modulating to a low frequency.

12. A base station operation method for compensating a fixed route delay factor between a base station and a mobile station of a CDMA mobile communication system, comprising the steps of:

a first step in which a clock signal generation unit receives a

10MHz, TOD and 1PPS signal from a GPS receiving unit and generates a 1st even second clock signal in synchronization with the 1PPS and a 2nd even second clock signal by delaying the 1st even second clock signal by the maximum bidirectional propagation delay time between a base station and a relay unit;

5 a second step in which first and second signal processing unit receive 1st and 2nd even second clock signals and modulate a pilot channel, a synchronous channel and a call channel from the first signal processing unit in synchronization with the 1st even second clock signal;

10 a third step when an access channel is transmitted from the mobile station, the second signal processing unit detects and demodulates an access channel from the mobile station in synchronization with the 2nd even second clock signal;

15 a fourth step in which the second signal processing unit modulates a communication channel of a forward link from a base station to a mobile station by expediting by the maximum bidirectional delay time between a base station and a relay unit; and

20 a fifth step in which when a communication channel is transmitted from the mobile station, the second signal processing unit detects and demodulates a communication channel from the mobile station in synchronization with the 2nd even second clock signal.

13. In a base station of a CDMA mobile communication system for  
25 compensating a router delay factor on a communication route between a



base station and a mobile station such as a relay unit, a base station for compensating a fixed route delay factor between a base station and a mobile station of a CDMA mobile communication system, comprising:

5 a clock signal generating unit for receiving a 10MHz, TOD and 1 PPS signal from a GPS receiving unit and generating a 1st even second clock signal in synchronization with the 1PPS;

10 a 1''st signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit, modulating a pilot channel, a synchronous channel and a call channel of a forward link from a base station to a mobile station by expediting by the maximum bidirectional propagation delay time and detecting and demodulating an access channel of the backward link from the mobile station to the base station in synchronization with the 1st even second clock signal; and

15 a 2''nd signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit, modulating a communication channel of a forward link from the base station to the mobile station by expediting by the maximum bidirectional propagation delay time between the base station and the relay unit and detecting and demodulating a communication channel of a backward link from the mobile station to the base station in synchronization with the 1st even second clock signal.

25 14. The base station of claim 13, wherein said 1''st signal processing unit includes:

more than one channel card which includes more than one channel element having a set of base station modem ASICs for modulating and demodulating a digital signal, and a channel card processor for controlling the channel element for thereby modulating a pilot channel, a synchronous channel and a call channel of a forward link by expediting by the maximum bidirectional propagation time between the base station and the relay unit; and

an analog modulation and demodulation unit which includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK demodulation unit for receiving a RF signal and QPSK-demodulating the same, and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting into a digital signal.

15. The base station of claim 13, wherein said 2<sup>nd</sup> signal processing unit includes:

more than one channel card which includes more than one channel element having a set of base station model ASICs for thereby modulating and demodulating a digital signal, and a channel card processor for controlling the channel element for thereby modulating a communication channel of a forward link and detecting and demodulating a communication channel of a backward link; and

an analog modulation and demodulation unit which includes a D/A

converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK demodulation unit for receiving a RF signal and QPSK-demodulating the same, and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting into a digital signal.

16. The method of claim 13, wherein said 1<sup>st</sup> and 2<sup>nd</sup> signal processing units include a channel card and an analog modulation and demodulation unit, and said channel card includes a plurality of channel elements and a channel card processor for controlling the channel element, and said channel elements modulates a pilot channel a synchronous channel and a call channel of a forward link, demodulates an access channel of a backward link, modulates a communication channel of a forward link and demodulates a communication channel of a backward link channel, and said analog modulation and demodulation unit includes a D/A converter for receiving a digital signal from the channel card and converting into an analog signal, a QPSK modulation unit for receiving an analog signal from the D/A converter and QPSK-modulating the same, a QPSK demodulation unit for receiving a RF signal and QPSK-demodulating the same, and an A/D converter for receiving a QPSK demodulation signal from the QPSK demodulation unit and converting into a digital signal.

17. The base station of claim 13, further comprising a RF signal processing means connected between the first and second signal processing unit and a relay unit and having a RF transmission unit for receiving a forward link channel from the first and second signal processing units and modulating to a high frequency, and a RF receiving unit for receiving a backward channel signal from the relay unit for modulating to a low frequency.

18. A base station operation method for compensating a fixed route delay factor between a base station and a mobile station of a CDMA mobile communication system, comprising the steps of:

a 1<sup>st</sup> step in which a clock signal generation unit receives a 10MHz, TOD and 1PPS signal from a GPS receiving unit and generates a 1st even second clock signal in synchronization with the 1PPS;

a second step in which said 1<sup>st</sup> and 2<sup>nd</sup> signal processing units receive a 1st even second clock signal and modulate a pilot channel, a synchronous channel and a call channel by expediting by the maximum bidirectional propagation delay time between a base station to a relay unit;

a third step in which when an access channel is transmitted from the mobile station, the 1<sup>st</sup> signal processing unit detects and demodulates an access channel from the mobile station in synchronization with the 1st even second clock signal;

a fourth step in which the 2<sup>nd</sup> signal processing unit modulates a communication channel of a forward link from the base station to the

mobile station by expediting by the maximum bidirectional propagation delay time between the base station and the relay unit; and

a fifth step in which when a communication channel is transmitted from the mobile station, the 2<sup>nd</sup> signal processing unit detects and demodulates the communication channel from the mobile station in synchronization with the 1st even second clock signal.

19. In a base station of a CDMA mobile communication system capable of compensating a route delay factor on a communication route between a base station and a mobile station such as on a relay unit, a base station for compensating a route delay factor fixed between a base station and a mobile station of a CDMA mobile communication system, comprising:

a clock signal generation unit for receiving a 10MHz, TOD and 1 PPS signal from a GPS receiving unit and generating a 1st even second clock signal in synchronization with the 1 PPS and a 3rd even second clock signal which is obtained by delaying the 1st even second clock signal by a maximum bidirectional propagation delay time between a base station and a relay unit;

a signal processing unit for receiving a 3rd even second clock signal from the clock signal generation unit and modulating and transmitting a forward link channel from a base station to a mobile station in synchronization with the 3rd even second clock signal; and

a signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit and detecting and

demodulating a backward link channel from the mobile station to the base station in synchronization with the 1st even second clock signal.

20. In a base station of a CDMA mobile communication system capable of compensating a route delay factor on a communication route between a base station and a mobile station such as on a relay unit, a base station for compensating a route delay factor fixed between a base station and a mobile station of a CDMA mobile communication system, comprising:

10 a clock signal generation unit for receiving a 10MHz, TOD and 1 PPS signal from a GPS receiving unit and generating a 1st even second clock signal in synchronization with the 1 PPS and a 3rd even second clock signal which is obtained by delaying the 1st even second clock signal by a maximum bidirectional propagation delay time between a  
15 base station and a relay unit;

a signal processing unit for receiving the 3rd even second clock signal from the clock signal generation unit and modulating a pilot channel, a synchronous channel and a call channel of a forward link from a base station to a mobile station in synchronization with the 3rd  
20 even second clock signal; and

a signal processing unit for receiving the 1st even second clock signal from the clock signal generation unit, demodulating a backward link channel from the mobile station to the base station in synchronization with the 1st even second clock signal and modulating  
25 a communication channel of a forward link from the base station to the

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mobile station by expediting by the maximum bidirectional propagation delay time between the base station to the relay unit.

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